

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Carlson et al.
Assignee: Maxtor Corporation
Title: DISK DRIVE WITH IMPROVED TECHNIQUES FOR
DETECTING HEAD FLYING HEIGHT (AS AMENDED)
Serial No.: 09/224,202 Filed: December 30, 1998
Examiner: Sniezek, A. Group Art Unit: 2651
Atty. Docket No.: 3123-233-1

COMMISSIONER FOR PATENTS
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**APPEAL BRIEF
(37 C.F.R. § 41.37)**

Dear Sir:

This Appeal Brief is in furtherance of the Notice of Appeal filed concurrently herewith.

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I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Maxtor Corporation.

II. RELATED APPEALS AND INTERFERENCES

A Decision on Appeal dated April 28, 2004 was issued for the application.

A Decision on Appeal dated May 27, 2004 was issued for U.S. Application Serial No. 09/843,631 filed April 27, 2001 (now U.S. Patent No. 6,894,854) which is a divisional of the application.

There are no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMED SUBJECT MATTER

A. Total Number of Claims in Application

Claims in the application are: 1-126

B. Status of All Claims

1. Claims canceled: 1-46, 51, 52, 59, 60, 67-86, 89, 90, 99, 100, 107, 114, 116, 117 and 124
2. Claims withdrawn: NONE
3. Claims pending: 47-50, 53-58, 61-66, 87, 88, 91-98, 101-106, 108-113, 115, 118-123, 125 and 126
4. Claims allowed: NONE
5. Claims objected to: 47-50, 53-58, 61-66, 91, 94-96, 101, 104-106, 113 and 123
5. Claims rejected: 87, 88, 92, 93, 97, 98, 102, 103, 108-112, 115, 118-122, 125 and 126

C. Claims on Appeal

Claims on appeal are: 87, 88, 92, 93, 97, 98, 102, 103, 108-112, 115, 118-122, 125 and 126

IV. STATUS OF AMENDMENTS

No amendments have been filed after the outstanding Office Action dated November 17, 2005.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is generally directed to a disk drive (disk drive 10, page 13, lines 16-17, Fig. 1) that includes a detection circuit (apparatus 50, page 20, lines 8-11, Fig. 5) that determines whether a head (head 18, page 13, lines 20-24, Fig. 1) is within an acceptable flying height range over a disk (disk 14, page 13, lines 20-24, Fig. 1) in response to first and second data patterns (AGC field 40 and C/D bursts 46, 48, page 18, lines 17-26, Fig. 4) stored on the disk (disk 14, page 13, lines 20-24, Fig. 1). The first data pattern (AGC field 40, page 18, lines 17-19, Fig. 4) has a first frequency, and the second data pattern (C/D bursts 46, 48, page 18, lines 22-26, Fig. 4) has a second frequency that is higher than the first frequency. The first and second data patterns (AGC field 40 and C/D bursts 46, 48, page 18, lines 17-26, Fig. 4) are located in separate non-overlapping circumferential portions of a track on the disk (Fig. 3).

The detection circuit (apparatus 50, page 20, lines 8-11, Fig. 5) determines whether the head (head 18, page 13, lines 20-24, Fig. 1) is within an acceptable flying height range while the head (head 18, page 13, lines 20-24, Fig. 1) is at a substantially constant flying height independently of flying height data obtained from the disk drive (disk drive 10, page 13, lines 16-17, Fig. 1) (1) at other than the substantially constant flying height (page 4, line 13 to page 5, line 2; page 16, line 21 to page 17, line 11; page 20, line 18 to page 21, line 22), and/or (2) at a predetermined flying height (page 4, line 13 to page 5, line 2; page 16, line 21 to page 17, line 11; page 20, line 18 to page 21, line 22).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issues on appeal are (1) whether claims 87, 88, 93, 97, 98, 103, 110, 111, 120 and 121 should be rejected under 35 U.S.C. § 102(b) as being anticipated by *Brown et al.*, and (2) whether claims 92, 102, 108, 109, 112, 115, 118, 119, 122, 125 and 126 should be rejected under 35 U.S.C. § 103(a) as being unpatentable over *Brown et al.* in view of *Gyi et al.*

VII. ARGUMENT

1. SECTION 102 REJECTIONS – BROWN ET AL.

Claims 87, 88, 93, 97, 98, 103, 110, 111, 120 and 121 are rejected under 35 U.S.C. § 102(b) as being anticipated by *Brown et al.* (U.S. Patent No. 4,777,544).

Brown et al. discloses an apparatus for calculating flying height. The flying height calculation involves taking a first measurement where the first flying height is sought, a second measurement at a predetermined reference height (such as zero clearance), and performing a calculation based on these measurements. For instance, a first measurement (or reference measurement) is taken at a zero clearance, defined as where the slider contacts the disk, a second measurement at a different flying height is then taken, and the change in flying height occurring between the first and second measurements is then calculated.

In a first embodiment, a single signal of constant periodicity is written over a predetermined area of the recording medium, a first signal is sensed at a first flying height from the predetermined area, the flying height is reduced to a second flying height of substantially zero, a second signal is sensed at the second flying height, and the first flying height is calculated as a ratio, expressed in decibels, of the first and second signals times the wavelength divided by a constant (col. 2, lines 31-42).

In a second embodiment, a plurality of signals of constant periodicity are written over the predetermined area of the recording medium, first and second signals with first and second wavelengths are simultaneously sensed at the first flying height, the flying height is reduced to a second flying height of substantially zero, third and fourth signals with the first and second wavelengths are simultaneously sensed at the second flying height, and the first flying height is calculated as a constant times the product of two terms. The first term is the product of the two wavelengths divided by the difference between the two wavelengths, and the second term is the ratio of the first and second signals, expressed in decibels, subtracted from the ratio of the third and fourth signals, expressed in decibels (col. 2, lines 43-58).

In a third embodiment, at least one signal of constant periodicity is written over the predetermined area so that the readback signal has a spectral content comprising a plurality of different frequencies, first and second signals with first and second wavelengths are simultaneously sensed at the first flying height, the flying height is reduced to a second flying height of substantially zero, third and fourth signals with the first and second wavelengths are sensed at the second flying height, and the first flying height is calculated as the product of two terms. The first term is a constant times a velocity divided by the difference in frequency between the first and second signals. The second term is the difference of the ratio, expressed in decibels, of the first and second signals at the first and second wavelengths and the ratio, expressed in decibels, of the third and fourth signals at the first and second wavelengths (col. 2, line 59 to col. 3, line 14).

Brown et al. discloses that the predetermined area of the disk where the signal is recorded is preferably a part of landing area tracks 42 and 44 but could as well be in one of the data track areas 46 or 48. *Brown et al.* also discloses that the dual-wavelength method requires recording two magnetic wavelengths either on adjacent tracks or preferably interleaved on one track or track segment.

Claim 87 recites “a detection circuit that determines whether the head is within an acceptable flying height range in response to the first and second data patterns while the head is at a substantially constant flying height.”

Claim 97 recites “a detection circuit that determines whether the head is within an acceptable flying height range in response to the first and second data patterns without moving the head to a substantially different flying height.”

Brown et al. calculates the flying height by adjusting the clearance of the slider over the disks to a reference clearance, such as zero clearance. The reference fly height values known by the previous determination are obtained by adjusting the flying height to a known reference value (such as zero clearance) that is different than the unknown flying height, and the reference flying height values are used to calculate the unknown flying height. Claims 87 and 97 explicitly preclude this approach.

In sustaining this rejection, the Examiner states that “Brown et al. teaches a disk drive . . . which determines if a head is in an acceptable flying height (change in flying height) while the head is at a substantially constant flying height.” Applicant disagrees. The Examiner has not even attempted to explain how *Brown et al.* teaches the limitations discussed above.

Moreover, the Board of Patent Appeals and Interferences rejected this position in the Decision on Appeal dated April 28, 2004. The Board stated as follows:

As argued by appellants, the determination of flying height in Brown requires that the drive be moved to a different reference flying height such as zero clearance and that additional measurements be made at the zero clearance flying height.

In view of the Board’s Decision, the Examiner is precluded from taking the position that *Brown et al.* discloses a detection circuit that determines whether the head is within an acceptable flying height range in response to the first and second data patterns (1) while the head is at a substantially constant flying height (claim 87), or (2) without moving the head to a substantially different flying height (claim 97).

For this reason alone, claims 87 and 97 clearly distinguish over *Brown et al.*

Claims 87 and 97 also recite that “the first and second data patterns are located in separate non-overlapping circumferential portions of the first track.”

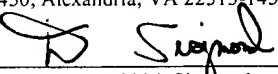
Brown et al. fails to disclose first and second signals with first and second frequencies used for fly height detection be placed in separate non-overlapping circumferential portions of a track. Instead, the first and second signals are either placed on adjacent tracks or are interleaved with on another on a track.

Under 35 U.S.C. § 102, anticipation requires that each and every element of the claimed invention be disclosed in the prior art. *Akzo N.V. v. United States International Trade Commission*, 1 USPQ 2d 1241, 1245 (Fed. Cir. 1986), *cert. denied*, 482 U.S. 909 (1987). That is, the reference must teach every aspect of the claimed invention. M.P.E.P. § 706.02. Anticipation cannot be sustained by ignoring claim elements.

2. SECTION 103 REJECTIONS – BROWN ET AL. AND GYI ET AL.

Claims 92, 102, 108, 109, 112, 115, 118, 119, 122, 125 and 126 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Brown et al.* in view of *Gyi et al.* (U.S. Patent No. 4,146,911). Applicant respectfully submits that these rejections are moot for the reasons given above.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on November 22, 2005.

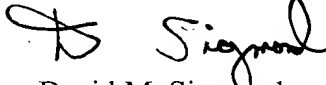


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11, 22, 05

Date of Signature

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VIII. CLAIMS APPENDIX

1 87. A disk drive, comprising:
2 a disk having a plurality of concentric tracks for storing data, the tracks including a first
3 track having a first data pattern with a first frequency and a second data pattern with a second
4 frequency that is higher than the first frequency, wherein the first and second data patterns are
5 located in separate non-overlapping circumferential portions of the first track;
6 a head for reading data from and writing data to the disk; and
7 a detection circuit that determines whether the head is within an acceptable flying height
8 range in response to the first and second data patterns while the head is at a substantially constant
9 flying height.

1 88. The disk drive of claim 87, wherein the second data pattern is a constant
2 frequency pattern.

1 92. The disk drive of claim 87, wherein the second data pattern is located in a servo
2 burst field.

1 93. The disk drive of claim 87, wherein the detection circuit determines whether the
2 head is within an acceptable flying height range while the head is at a non-predetermined flying
3 height.

1 97. A disk drive, comprising:
2 a disk having a plurality of concentric tracks for storing data, the tracks including a first
3 track having a first data pattern with a first frequency and a second data pattern with a second
4 frequency that is higher than the first frequency, wherein the first and second data patterns are
5 located in separate non-overlapping circumferential portions of the first track;
6 a head for reading data from and writing data to the disk; and

7 a detection circuit that determines whether the head is within an acceptable flying height
8 range in response to the first and second data patterns without moving the head to a substantially
9 different flying height.

1 98. The disk drive of claim 97, wherein the second data pattern is a constant
2 frequency pattern.

1 102. The disk drive of claim 97, wherein the second data pattern is located in a servo
2 burst field.

1 103. The disk drive of claim 97, wherein the detection circuit determines whether the
2 head is within an acceptable flying height range while the head is at a non-predetermined flying
3 height.

1 108. The disk drive of claim 87, wherein the first and second data patterns are
2 circumferentially spaced from one another.

1 109. The disk drive of claim 87, wherein the first and second data patterns each
2 intersect a centerline of the first track.

1 110. The disk drive of claim 87, wherein the first data pattern is circumferentially
2 adjacent to a first user data field on the first track.

1 111. The disk drive of claim 110, wherein the second data pattern is circumferentially
2 adjacent to a second user data field on the first track.

1 112. The disk drive of claim 87, wherein the first and second data patterns are
2 circumferentially adjacent to and separated by a region of the first track that is devoid of a user
3 data field.

1 115. The disk drive of claim 87, wherein only one of the first and second data patterns
2 provides servo positioning information.

1 118. The disk drive of claim 97, wherein the first and second data patterns are
2 circumferentially spaced from one another.

1 119. The disk drive of claim 97, wherein the first and second data patterns each
2 intersect a centerline of the first track.

1 120. The disk drive of claim 97, wherein the first data pattern is circumferentially
2 adjacent to a first user data field on the first track.

1 121. The disk drive of claim 120, wherein the second data pattern is circumferentially
2 adjacent to a second user data field on the first track.

1 122. The disk drive of claim 121, wherein the first and second data patterns are
2 circumferentially adjacent to and separated by a region of the first track that is devoid of a user
3 data field.

1 125. The disk drive of claim 97, wherein only one of the first and second data patterns
2 provides servo positioning information.

1 126. The disk drive of claim 97, wherein both of the first and second data patterns
2 provide servo positioning information.